

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problems Mailbox.**

PCT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
 United States Patent and Trademark
 Office
 Box PCT
 Washington, D.C. 20231
 ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year)

11 August 2000 (11.08.00)

International application No.

PCT/EP99/10498

Applicant's or agent's file reference

TH 1457 PCT

International filing date (day/month/year)

29 December 1999 (29.12.99)

Priority date (day/month/year)

31 December 1998 (31.12.98)

Applicant

TJEENK WILLINK, Cornelis, Antonie

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

29 June 2000 (29.06.00)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
 34, chemin des Colombettes
 1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Juan Cruz

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference TH 1457 PCT	FOR FURTHER ACTION <small>see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.</small>	
International application No. PCT/EP 99/ 10498	International filing date (day/month/year) 29/12/1999	(Earliest) Priority Date (day/month/year) 31/12/1998
Applicant SHELL INTERNATIONALE RESEARCH ... et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1
☐ None of the figures.

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E21B43/34 B01D45/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 E21B B01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 148 735 A (C.C.LAVAL, JR.) 10 April 1979 (1979-04-10) claim 1; figure 1	1
A	EP 0 496 128 A (STORK PRODUCT ENGINEERING B.V.) 29 July 1992 (1992-07-29) cited in the application the whole document	1
A,P	WO 99 01194 A (SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ B.V.) 14 January 1999 (1999-01-14) cited in the application claims 1-12; figures 1,2	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"A" document member of the same patent family

Date of the actual completion of the international search

24 May 2000

Date of mailing of the international search report

30/05/2000

Name and mailing address of the ISA

European Patent Office, P.B. 6818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Bertram, H

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

P 99/10498

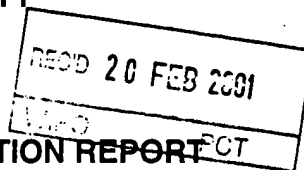
Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4148735 A	10-04-1979	AT 2117 T CA 1108982 A DE 2964417 D EP 0008283 A	15-01-1983 15-09-1981 03-02-1983 20-02-1980
EP 496128 A	29-07-1992	NONE	
WO 9901194 A	14-01-1999	AU 8857098 A NO 996546 A ZA 9805706 A	25-01-1999 29-12-1999 27-01-1999

ATENT COOPERATION TR

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)





Applicant's or agent's file reference TH 1457 PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP99/10498	International filing date (day/month/year) 29/12/1999	Priority date (day/month/year) 31/12/1998
International Patent Classification (IPC) or national classification and IPC E21B43/34		
Applicant SHELL INTERNATIONALE RESEARCH ... et al.		

- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 4 sheets, including this cover sheet.
 - ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 9 sheets.

- This report contains indications relating to the following items:
 - I ☒ Basis of the report
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☒ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 29/06/2000	Date of completion of this report 16.02.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Bellingacci, F 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP99/10498

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).)*:

Description, pages:

1,3,4,6-11, 14-17	as originally filed			
2,2a,5,5a,12,13	as received on	05/01/2001	with letter of	05/01/2001

Claims, No.:

1-15	as received on	05/01/2001	with letter of	05/01/2001
------	----------------	------------	----------------	------------

Drawings, sheets:

1/4-4/4	as originally filed
---------	---------------------

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP99/10498

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 1-15
	No:	Claims
Inventive step (IS)	Yes:	Claims 1-15
	No:	Claims
Industrial applicability (IA)	Yes:	Claims 1-15
	No:	Claims

- 2. Citations and explanations**
see separate sheet

VI. Certain documents cited

- 1. Certain published documents (Rule 70.10)**

and / or

- 2. Non-written disclosures (Rule 70.9)**

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP99/10498

Reference is made to the following documents:

D1 = EP 0 496 128 A

D2 = EP 0 711 903 A (not cited in the search report)

D3 = US 3 599 400 A (not cited in the search report)

V - Reasoned statement under Rule 66.2 (a)(ii)

V-1 D1, which is considered as the closest prior art, describes a method according to the preamble of claim 1. The features in the characterizing part of the claim are new and the claim meets therefore the novelty requirement of Art. 33(2) PCT.

V-2 By means of the characterizing step of claim 1 it is achieved, that already at the wellhead the gas is stripped of constituents, which could condense in later stages as, for example, shipment in a pipeline. This result is achieved in a particularly efficient way by providing cooling and separation at the same stage and without the use of coolants.

The known documents (see in particular D2 and D3) teach to provide at the wellhead separation of water and oil from gas, but no evidences are available which show, that it is known to remove also condensable at the wellhead, let alone by means of a supersonic separator. Even though supersonic separation is in itself known (see D1), it is therefore considered that the subject-matter of claim 1 involves an inventive step.

V-3 Claims 2 to 6 meet the requirements of Art. 33(2) and (3) PCT as they are formulated as depending from a claim which does meet said requirements. Apparatus claim 7 and related dependant claims 8 to 15 meet also said requirements as claim 7 specifies, in structural terms, the same inventive concept specified in method terms in claim 1.

V-4 The devices and methods of claims 1 to 15 find industrial application in the production of oil from oil wells.

VI - Certain cited documents

Publication n.	Publication date	Priority date
WO 99/01194A	14/01/1999	02/07/1997

PCT

INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : E21B 43/34, B01D 45/16	A1	(11) International Publication Number: WO 00/40834 (43) International Publication Date: 13 July 2000 (13.07.00)
--	----	--

(21) International Application Number: PCT/EP99/10498

(22) International Filing Date: 29 December 1999 (29.12.99)

(30) Priority Data:
09/223,887 31 December 1998 (31.12.98) US

(71) Applicant (for all designated States except US): SHELL
INTERNATIONALE RESEARCH MAATSCHAPPIJ B.V.
[NL/NL]; Carel Van Bylandtlaan 30, NL-2596 HR The
Hague (NL).

(72) Inventor; and

(75) Inventor/Applicant (for US only): TJEENK WILLINK, Cor-
nelis, Antonie [NL/NL]; Volmerlaan 8, NL-2288 GD Ri-
jswijk (NL).

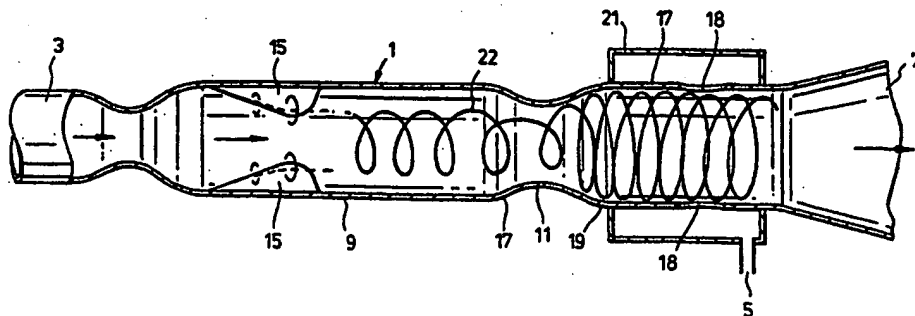
(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG,
BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE,
ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP,
KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA,
MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU,
SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG,
US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE,
LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM,
AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT,
BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU,
MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM,
GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published

With international search report.

Before the expiration of the time limit for amending the
claims and to be republished in the event of the receipt of
amendments.

(54) Title: METHOD FOR REMOVING CONDENSABLES FROM A NATURAL GAS STREAM, AT A WELLHEAD, DOWN-
STREAM OF THE WELLHEAD CHOKE



(57) Abstract

The present invention relates to a method for removing condensables from a natural gas stream, at a wellhead, downstream of the wellhead choke thereof. In accordance with the invention there is provided a method for removing condensables from a natural gas stream at a wellhead, the method comprising the steps of: (A) inducing the natural gas stream to flow at supersonic velocity through a conduit of a supersonic inertia separator and thereby causing the fluid to cool to a temperature that is below a temperature/pressure at which the condensables will begin to condense, forming separate droplets and/or particles; (B) separating the droplets and/or particles from the gas; and (C) collecting the gas from which the condensables have been removed, wherein the supersonic inertia separator is part of the wellhead assembly downstream of the wellhead choke. There is also provided a device for removing said condensables from said natural gas that is part of the wellhead assembly downstream of the choke, a wellhead assembly comprising said device.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 99/10498

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E21B43/34 B01D45/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 E21B B01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 148 735 A (C.C.LAVAL, JR.) 10 April 1979 (1979-04-10) claim 1; figure 1	1
A	EP 0 496 128 A (STORK PRODUCT ENGINEERING B.V.) 29 July 1992 (1992-07-29) cited in the application the whole document	1
A,P	WO 99 01194 A (SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ B.V.) 14 January 1999 (1999-01-14) cited in the application claims 1-12; figures 1,2	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

24 May 2000

Date of mailing of the international search report

30/05/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Bertram, H.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 99/10498

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4148735 A	10-04-1979	AT 2117 T CA 1108982 A DE 2964417 D EP 0008283 A	15-01-1983 15-09-1981 03-02-1983 20-02-1980
EP 496128 A	29-07-1992	NONE	
WO 9901194 A	14-01-1999	AU 8857098 A NO 996546 A ZA 9805706 A	25-01-1999 29-12-1999 27-01-1999